Billings Clinic

2800 Tenth Avenue North
P.O. Box 37000
Billings, Montana 59107-7000

Testimony by Mark C. Rumans, M.D., Physician in Chief
Billings Clinic

Senate Bill 439
Senate Bill 446
February 18, 2009

Members of the Committee, thank you very much for your time this afternoon. I am Mark Rumans, MD, Physician in Chief at Billings Clinic. I am here today to speak as a proponent of both Senate Bills 439 which continues the moratorium on the licensure of specialty hospitals through 2011 as well as Senate Bill 446 which is a proposal to lift the moratorium should the committee so decide.

In January of 2008, the Office of the Inspector General released a report on Physician owned Specialty Hospitals which examined these hospitals ability to manage medical emergencies. I have included the executive summary for your review but would like to comment on the salient features which Senate Bill 446 would address:

1. About 50% of all physician owned specialty hospitals have emergency departments.
2. Two thirds of physician owned specialty hospitals use 9-1-1 as part of their emergency procedures.
3. Some physician owned specialty hospitals lack basic information in their written policies about managing medical emergencies.

Clearly, the ability to manage medical emergencies is critical to the quality of care provided in any hospital and if specialty hospitals are to move forward in the State of Montana, this is an area that needs to be addressed. Senate Bill 446 provides for the ability for specialty hospitals to assure that emergency services are available beyond simply using 9-1-1 and provides for appropriate transfer provisions.

There is a lot yet to learn about physician owned specialty hospitals. Articles and studies have been done on both sides of the cost and quality discussion- do they lower cost, do they improve quality or do they do just the opposite?

At least one study (***"Opening of Specialty Cardiac Hospitals and Use of Coronary Revascularization in Medicare Beneficiaries"*** JAMA, March, 7, 2007, Vol 297, N0 9) did show that the opening of a new cardiac specialty hospital was associated with the increased population rate of coronary re-vascularization in Medicare beneficiaries compared to those areas where new cardiac programs opened in general hospitals or no new cardiac programs opened. I have attached this article for your review. Specifically, the rate of change for PCI not associated with acute heart attack (percutaneous coronary intervention or commonly known as using a balloon to

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expand a coronary artery) was **significantly higher** in areas with new cardiac hospitals despite the fact that the benefits are not as clear for this group of patients. Although these findings could be explained by other issues than physician ownership of specialty hospitals, self referral can be a subtle and seductive issue that should be considered if the moratorium is eventually lifted.

The issue of self referral and its potential impact on volume has been recognized by the Congressional Budget Office. In its budget estimates they have concluded that banning physician self referral would lead to significant cost savings in the Medicare program because of the impact on utilization that does not lead to improved outcomes.

By putting in place licensing requirements and a third party consultant to examine the impact of specialty hospital on the community; Senate Bill 446 will put into place a mechanism to consider the potential risks and benefits a specialty hospital may have on a community.

Thank you very much for your time and consideration and I remain available for questions.

Mark C. Rumans, M.D.
Physician in Chief
Billings Clinic

Department of Health and Human Services

OFFICE OF INSPECTOR GENERAL

PHYSICIAN-OWNED SPECIALTY HOSPITALS' ABILITY TO MANAGE MEDICAL EMERGENCIES

Daniel R. Levinson
Inspector General

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Office of Inspector General

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EXECUTIVE SUMMARY

OBJECTIVE

To assess physician-owned specialty hospitals' ability to manage medical emergencies.

BACKGROUND

Physician-owned specialty hospitals are hospitals that primarily perform cardiac, orthopedic, or surgical procedures and are partially or fully owned by physician investors. Two recent deaths of specialty hospital patients have raised concerns about the ability of these hospitals to manage medical emergencies. In both instances, a patient experienced complications following elective surgery. Neither hospital had a physician on duty at the time the emergency occurred, and both hospitals called 9-1-1. The patients were then transferred to community hospitals, where they were both pronounced dead.

All hospitals that participate in the Medicare program must demonstrate to the Centers for Medicare & Medicaid Services (CMS) their initial and ongoing ability to meet a set of health and safety standards, referred to as the Conditions of Participation (CoP). The CoPs require that all hospitals have a physician on duty or on call at all times. Hospitals are also required to provide 24-hour nursing services, furnished or supervised by a registered nurse. In addition, the CoPs require that hospitals have written policies and procedures in place for addressing individuals' emergency care needs, regardless of whether the hospital has an emergency department. Finally, according to CMS, a hospital is not in compliance with the CoPs if it relies on 9-1-1 services as a substitute for its own emergency services. However, there is no specific Medicare prohibition on a hospital calling 9-1-1 to arrange for the transfer of a patient to another hospital.

The Senate Finance Committee requested that the Office of Inspector General (OIG) conduct an evaluation of patient care and safety in physician-owned specialty hospitals. This study focuses on hospitals' emergency departments, staffing patterns, and written policies for managing medical emergencies. It is based on data from 109 physician-owned specialty hospitals that we identified from a list provided by CMS. CMS currently does not have a system in place to track physician-owned specialty hospitals or to identify newly enrolled physician-owned specialty hospitals.

The study relies on four primary sources of data: (1) a review of physician and nurse staffing schedules for 8 sampled days, (2) a review of hospitals' staffing policies, (3) a review of hospitals' policies for managing medical emergencies, and (4) structured interviews with administrators at each hospital.

FINDINGS

About half of all physician-owned specialty hospitals have emergency departments, the majority of which have only one emergency bed. Fifty-five percent of all physician-owned specialty hospitals have an emergency department. More than half of these hospitals have only one emergency bed. Another 17 percent of these hospitals have between 2 and 5 emergency beds, 15 percent have between 6 and 8 emergency beds, and 8 percent have 9 or 10 emergency beds. Medicare does not require that hospitals have emergency departments, but some States do have this requirement.

Not all physician-owned specialty hospitals had nurses on duty and physicians on call during the 8 sampled days. Based on our review of hospitals' staffing schedules, 93 percent of physician-owned specialty hospitals met these two requirements during our 8 sampled days. The remaining 7 percent of hospitals did not meet these requirements. Specifically, seven hospitals failed to have a registered nurse on duty and one hospital failed to have a physician on call or on duty during at least 1 of the 8 sampled days. Hospitals were least likely to meet these staffing requirements on weekends.

Administrators report that less than one-third of physician-owned specialty hospitals have physicians onsite at all times. According to administrators, 28 percent of hospitals have a physician onsite 24 hours a day, 7 days a week. Additionally, 45 percent of the hospitals with emergency departments have a physician onsite at all times, compared to 8 percent of the hospitals without emergency departments. Medicare does not require that hospitals have physicians onsite at all times.

Two-thirds of physician-owned specialty hospitals use 9-1-1 as part of their emergency response procedures. According to administrators and our review of hospital policies, 66 percent of hospitals instruct staff to call 9-1-1 as part of their medical emergency response procedures. Most notably, 34 percent of hospitals use 9-1-1 to obtain medical assistance to stabilize a patient, a practice that may

violate Medicare requirements. Almost half of all hospitals (46 percent) use 9-1-1 to transfer patients, a practice that is permitted by Medicare.

Some physician-owned specialty hospitals lack basic information in their written policies about managing medical emergencies. Almost a quarter of all physician-owned specialty hospitals have policies that do not address appraisal of emergencies, initial treatment of emergencies, or referral and transfer of patients. In addition, some policies lack certain information about managing medical emergencies, such as the type of emergency response equipment to be used or the life-saving protocols to be followed.

RECOMMENDATIONS

Based on these findings, we recommend that CMS take the following actions to improve the ability of physician-owned specialty hospitals to manage medical emergencies. We recognize that although the scope of this study includes physician-owned specialty hospitals, some of the recommendations apply to all hospitals. Specifically, we recommend that CMS:

- Develop a system to identify and regularly track physician-owned specialty hospitals.
- Ensure that hospitals meet the current Medicare CoPs that require a registered nurse to be on duty 24 hours a day, 7 days a week and a physician to be on call if one is not onsite.
- Ensure that hospitals have the capabilities to provide for the appraisal and initial treatment of emergencies and that they are not relying on 9-1-1 as a substitute for their own ability to provide these services.
- Require hospitals to include necessary information in their written policies for managing a medical emergency, such as the use of emergency response equipment and the life-saving protocols to be followed.

In addition to making these recommendations, we will forward to CMS for appropriate action information on the 8 hospitals that did not meet the two staffing CoPs reviewed in the study and the 37 hospitals that use 9-1-1 to obtain medical assistance.

AGENCY COMMENTS

CMS concurred with all four of our recommendations.

In response to our first recommendation, CMS stated that it will add information to CMS's provider enrollment form and the new Provider Enrollment and Chain-Operated System.

In response to our second recommendation, CMS indicated that it currently examines hospital compliance with all Medicare CoPs through its routine hospital surveys. CMS does not conduct these surveys for the 42 percent of hospitals that are accredited by either the Joint Commission or the American Osteopathic Association. However, CMS investigates all credible complaints, including complaints against accredited hospitals. CMS stated that it will ensure that both accreditation organizations are aware of our findings.

In response to our third recommendation, CMS stated that it issued a program memorandum to State Survey Agencies during the period that we were conducting the study that reiterates its requirements for hospitals and addresses medical emergency requirements. CMS circulated this memorandum to the national accreditation organizations and made it available to the public through its Web site.

Finally, CMS concurred in principle with our fourth recommendation. CMS stated that it will consider whether regulatory changes to create more specific requirements for equipment and staff qualifications would be appropriate.

ORIGINAL CONTRIBUTION

Opening of Specialty Cardiac Hospitals and Use of Coronary Revascularization in Medicare Beneficiaries

Brahmajee K. Nallamothu, MD, MPH
Mary A. M. Rogers, PhD
Michael E. Chernew, PhD
Harlan M. Krumholz, MD, SM
Kim A. Eagle, MD
John D. Birkmeyer, MD

Context Although proponents argue that specialty cardiac hospitals provide high-quality cost-efficient care, strong financial incentives for physicians at these facilities could result in greater procedure utilization.

Objective To determine whether the opening of cardiac hospitals was associated with increasing population-based rates of coronary revascularization.

Design, Setting, and Patients In a study of Medicare beneficiaries from 1995 through 2003, we calculated annual population-based rates for total revascularization (coronary artery bypass graft [CABG] plus percutaneous coronary intervention [PCI]), CABG, and PCI. Hospital referral regions (HRRs) were used to categorize health care markets into those where (1) cardiac hospitals opened (n=13), (2) new cardiac programs opened at general hospitals (n=142), and (3) no new programs opened (n=151).

Main Outcome Measures Rates of change in total revascularization, CABG, and PCI using multivariable linear regression models with generalized estimating equations.

Results Overall, rates of change for total revascularization were higher in HRRs after cardiac hospitals opened when compared with HRRs where new cardiac programs opened at general hospitals and HRRs with no new programs ($P<.001$ for both comparisons). Four years after their opening, the relative increase in adjusted rates was more than 2-fold higher in HRRs where cardiac hospitals opened (19.2% [95% confidence interval {CI}, 6.1%-32.2%], $P<.001$) when compared with HRRs where new cardiac programs opened at general hospitals (6.5% [95% CI, 3.2%-9.9%], $P<.001$) and HRRs with no new programs (7.4% [95% CI, 3.2%-11.5%], $P<.001$). These findings were consistent when rates for CABG and PCI were considered separately. For PCI, this growth appeared largely driven by increased utilization among patients without acute myocardial infarction (42.1% [95% CI, 21.4%-62.9%], $P<.001$).

Conclusion The opening of a cardiac hospital within an HRR is associated with increasing population-based rates of coronary revascularization in Medicare beneficiaries.

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SPECIALTY HOSPITALS, WHICH PROvide care limited to specific medical conditions or procedures, are opening at a rapid pace across the United States.[1] Proponents argue that specialty hospitals provide higher-quality health care and greater cost-efficiency by concentrating physician skills and hospital resources needed for managing complex diseases.[2,3] Critics claim that specialty hospitals focus primarily on low-risk patients and provide less uncompensated care, which places competing general hospitals at significant financial risk.[4,5]

However, specialty hospitals raise an additional concern beyond their potential to simply redistribute cases within a health care market. Specialty hospitals are typically smaller than general hospitals and have high rates of physician ownership.[6] Physician owners may have stronger financial incentives for providing services that fuel greater utilization. Evidence for the potential of "physician-induced" demand of services exists in other health care settings like clinical laboratory and diagnostic imaging centers where self-referral by physician owners is restricted by federal law.[7,8] Thus, the opening of a specialty hospital may be expected to raise utilization more than by simply adding increased capacity for procedures to a market.

We sought to assess whether the opening of specialty cardiac hospitals was

For editorial comment see p 998.

Author Affiliations: VA Health Services Research and Development Center of Excellence, Ann Arbor, Mich (Dr Nallamothu); Department of Internal Medicine (Drs Nallamothu, Rogers, and Eagle) and Department of Surgery (Dr Birkmeyer), University of Michigan Medical School, Ann Arbor; Department of Health Care Policy, Harvard Medical School, Boston, Mass (Dr Chernew); and Department of Internal Medicine, Yale University School of Medicine, New Haven, Conn (Dr Krumholz).
Corresponding Author: Brahmajee K. Nallamothu, MD, MPH, University of Michigan Medical School, 1500 E Medical Center Dr, Ann Arbor, MI 48109-0366 (bnallamo@umich.edu).

associated with greater utilization of coronary revascularization services. We focused on cardiac hospitals since two thirds of Medicare payments to specialty hospitals are related to cardiac conditions.[9] To better distinguish the particular effects of specialty hospitals from the simple addition of capacity to a market, we separately compared areas where a cardiac hospital opened with those where new cardiac programs were introduced at general hospitals.

METHODS

Data Sources and Study Population

We obtained from the Centers for Medicare & Medicaid Services (CMS) Medicare Provider and Analysis Review (MEDPAR) Part A, Denominator, and Provider of Service files from 1995 through 2003. Part A files include data on acute care hospitalizations. Denominator files contain data on eligible Medicare beneficiaries for that year including demographic and enrollment information. Provider of Service files contain data on hospital providers including facility characteristics and ZIP code locations. Data on all Medicare beneficiaries aged 65 years or older enrolled in fee-for-service programs within the United States were included.

We used the *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*) procedural codes to identify patients undergoing coronary revascularization with coronary artery bypass grafting (CABG) (*ICD-9-CM* procedural codes 36.10-36.19) without concomitant aortic or valvular surgery and/or percutaneous coronary intervention (PCI) (*ICD-9-CM* procedural codes 36.01, 36.02, 36.05-36.07, 36.09). Hospitals that performed these procedures during the study period were identified using the same *ICD-9-CM* procedural codes. We included all hospitals with at least 3 CABG and/or PCI cases during one of the years in which the hospital reported data. The Institutional Review Board of the University of Michigan and the CMS approved this protocol prior to its initiation. The requirement for informed consent was waived and approved.

Specialty Hospital Identification

We categorized all hospitals that performed coronary revascularization into cardiac or general hospitals using an approach similar to the General Accounting Office and Cram et al.[10] Specifically, we constructed a cardiac specialty index based on the percentage of cardiac-to-total admissions in Medicare beneficiaries in 2002 and 2003. From this cardiac specialty index, we reviewed the top 100 facilities and selected those that (1) had proprietary or corporate ownership, and (2) did not provide broad medical or pediatric services. Data on additional services available at these hospitals were obtained from the American Hospital Association Annual Survey, the American Hospital Directory, and online hospital Web sites.[11,12] One cardiac hospital was excluded due to concerns regarding inconsistent participation within the Medicare program during the study period. To supplement this strategy, we also included any cardiac hospitals identified by the CMS during their recent national survey.[13]

As we were specifically interested in examining changes in use of coronary revascularization after the opening of a cardiac hospital, we excluded those that opened prior to January 1, 1996, and after December 31, 2002, to ensure at least 1 year of follow-up data. The year of opening was considered the first year that data were reported to the CMS for either procedure.

Statistical Analysis

We used hospital referral regions (HRRs) from the *Dartmouth Atlas of Cardiovascular Health Care* to identify health care markets.[14] Hospital referral regions are large geographic units representing distinct markets for tertiary care that were developed by studying patterns of hospital utilization for major cardiac surgery among Medicare beneficiaries in the early 1990s. Based on their ZIP code, patients and hospitals were assigned to 1 of 306 HRRs. Hospital referral regions were categorized into 3 types: (1) HRRs where a new cardiac hospital opened; (2) HRRs where a new cardiac program in CABG and/or PCI opened at a general hospital; and (3) HRRs where no new programs opened during the study period.

We calculated population-based rates for CABG and PCI in each of the 306 HRRs during each year of the study period. The numerator for these rates was the total number of eligible beneficiaries within the HRR who underwent the procedure during that calendar year. The denominator was the total number of eligible beneficiaries within the HRR in June of that year. Rates were adjusted for differences in age (65-69, 70-74, and 75 years or older), sex, and race (black, nonblack) across HRRs and years using direct standardization.[15]

Population-based rates of total revascularization (CABG plus PCI), CABG, and PCI were plotted by calendar year with general trends visualized using fractional polynomial regression.[16] We constructed multivariable linear regression models to assess the statistical significance of rates of change across the 3 types of HRRs after the opening of new programs. Repeated measures within HRRs were accounted for using generalized estimating equations with robust variance estimators with a first-order autoregressive correlation matrix structure assumed.[17,18] Additional correlation matrix structures (second-order autoregressive, exchangeable) were explored and results were robust to this assumption.

Models accounted for trends in time by including year as a categorical variable. We included interaction terms consisting of time since a new program opened by the type of HRR, ie, HRRs where cardiac hospitals opened and HRRs where new cardiac programs opened at general hospitals. Interaction terms took the value of "0" for HRRs with no new programs. Models adjusted for the following HRR-level variables: (1) annual population-based rates of acute myocardial infarc-

tion; (2) per capita number of cardiologists and cardiovascular surgeons at the midpoint of the study period; (3) geographic region (Northeast, South, Midwest, West); (4) the opening of multiple new programs (2 or more) over the study period; (5) tertiles of the annual percentage of managed care penetration; and (6) tertiles of a summary score of socioeconomic status[19] calculated from US Census data at the ZIP code level. Nonlinear relationships in rates of change were also evaluated using quadratic terms; results were similar and are not reported.

We performed 3 additional analyses. For PCI, we separately analyzed rates among patients with and without an acute myocardial infarction as identified by *ICD-9-CM* diagnostic code 410.x1 during their hospitalization. This analysis assessed how our results were influenced by procedural indication. Next, we evaluated rates of change in HRRs prior to the opening of cardiac hospitals or new cardiac programs at general hospitals. This analysis assessed whether cardiac hospitals were selectively opening in already growing markets. Finally, we examined procedural volumes at cardiac hospitals and new cardiac programs at general hospitals as well as their relative contributions to the number of coronary revascularizations performed within an HRR at the end of the study period. All analyses were performed using Stata version 9.0 (StataCorp, College Station, Tex) and P values of $<.05$ were considered significant. All tests were 2-sided.

RESULTS

We identified 13 HRRs with 14 new cardiac hospitals, 142 HRRs with 245 new cardiac programs at general hospitals, and 151 HRRs with no new programs during the study period. In 2003, the mean (SD) number of beds at the 14 cardiac hospitals was 55 (16), the mean volume of CABG was 233 (151), and the mean volume of PCI was 575 (247). Eleven (79%) of the 14 cardiac hospitals reported providing emergency services, while 1 (7%) reported any affiliation with a medical school. (Specific information regarding the 14 cardiac hospitals available from the authors on request.) TABLE 1 lists key summary characteristics of the 3 types of HRRs. Hospital referral regions with no new cardiac programs had fewer Medicare enrollees, but rates of total revascularization, CABG, and PCI were not significantly different at the start of the study period. Eleven (85%) of the 13 HRRs where cardiac hospitals opened had at least 1 additional new program open during the study period compared with 50 (35%) of the 142 HRRs where new cardiac programs opened at general hospitals.

FIGURE 1 and FIGURE 2 display population-based rates for total revascularization, CABG, and PCI between 1995 and 2003 across the 3 types of HRRs. There was noticeable separation of rates in HRRs where cardiac hospitals opened starting in approximately 1999, coinciding with the median year of opening for these facilities. The rate of change for total revascularization was significantly greater in HRRs after cardiac hospitals opened when compared with HRRs where new cardiac programs opened at general hospitals (difference, +4.2/10 000 per year [95%

Table 1. Key Summary Characteristics of Hospital Referral Regions (HRRs) by the Presence of New Programs During the Study Period

Characteristic	HRRs With New Cardiac Hospital (n = 13)	HRRs With New Cardiac Programs at General Hospitals (n = 142)	HRRs With No New Programs (n = 151)	*P* Value
Medicare fee-for-service enrollees per y, mean (SD), No. [1995-2003]	147 097 (78 583)	125 031 (112 202)	56 696 (38 003)	<.001
Medicare managed care enrollees per y, mean (SD), % [1995-2003]	12.6 (13.3)	11.6 (12.9)	11.1 (13.1)	.90
Rates of AMI per 10 000 per y, mean (SD) [1995-2003]	80.7 (13.4)	91.8 (20.0)	87.8 (22.8)	.09
Cardiologists and cardiothoracic surgeons per 100 000, mean (SD), No. [1999]	6.4 (1.2)	7.6 (2.3)	7.2 (2.3)	.12
No. (%) by US region				
Northeast	0 (0)	22 (15)	21 (14)	.38
Midwest	4 (31)	34 (24)	46 (30)	
South	5 (38)	62 (44)	52 (34)	
West	4 (31)	24 (17)	32 (21)	
Regions with >1 new program, No. (%)	11 (85)	50 (35)	NA	<.001
Adjusted rates per 10 000, mean (SD) [1995]*				
Coronary revascularization	111.6 (22.6)	107.3 (22.5)	105.6 (26.8)	.64
CABG	52.3 (14.2)	52.4 (11.6)	50.9 (13.2)	.58
PCI	59.2 (10.6)	54.9 (16.9)	54.7 (20.0)	.69
PCI with AMI	20.0 (3.0)	19.0 (6.1)	20.1 (6.3)	.29
PCI without AMI	39.3 (9.0)	35.9 (12.5)	34.5 (15.5)	.42

Abbreviations: AMI, acute myocardial infarction; CABG, coronary artery bypass grafting; PCI, percutaneous coronary intervention.
*Adjusted for age, sex, and race.

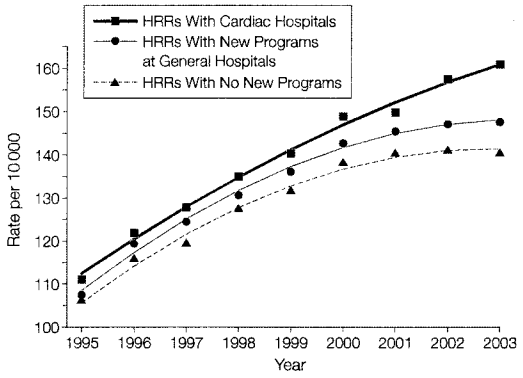
confidence interval [CI], 2.0-6.5]; $P<.001$) and HRRs with no new programs (difference, +4.0/10 000 per year [95% CI, 1.8-6.3]; $P<.001$). Four years after their opening, the relative increase in rates of total revascularization was more than 2-fold higher in HRRs where cardiac hospitals opened when compared with other HRRs (TABLE 2).

Similar findings were noted when we considered rates for CABG and PCI separately (Table 2). Although rates for CABG declined throughout the study period, the rate of change was less in HRRs after cardiac hospitals opened when compared with HRRs where new cardiac programs opened at general hospitals (difference, +2.1/10 000 per year [95% CI, 0.8-3.4]; $P=.001$) and HRRs with no new programs (difference, +1.9/10 000 per year [95% CI, 0.6-3.2]; $P=.005$). The rate of change for PCI also was higher in HRRs after cardiac hospitals opened when compared with HRRs where new cardiac programs opened at general hospitals (difference, +2.4/10 000 per year [95% CI, 0.5 to 4.2]; $P=.012$) and HRRs with no new programs (difference, +2.4/10 000 per year [95% CI, 0.5-4.2]; $P=.011$).

For PCI, these results varied when we considered the strength of the procedural indication (FIGURE 3). Among patients with acute myocardial infarction, no significant differences were seen in the rate of change for PCI across HRRs after cardiac hospitals opened (difference, −0.4/10 000 per year [95% CI, −0.9 to 0.1]; $P=.15$ when compared with HRRs where new cardiac programs opened at general hospitals; and difference, −0.3/10 000 per year [95% CI, −0.8 to 0.2]; $P=.26$ when compared with HRRs with no new programs). In contrast, the rate of change was significantly higher for PCI among patients without acute myocardial infarction in HRRs after cardiac hospitals opened when compared with HRRs where new cardiac programs opened at general hospitals (difference, +2.7/10 000 per year [95% CI, 1.1-4.3]; $P=.001$) and HRRs with no new programs (difference, +2.6/10 000 per year [95% CI, 1.0- 4.2]; $P=.002$).

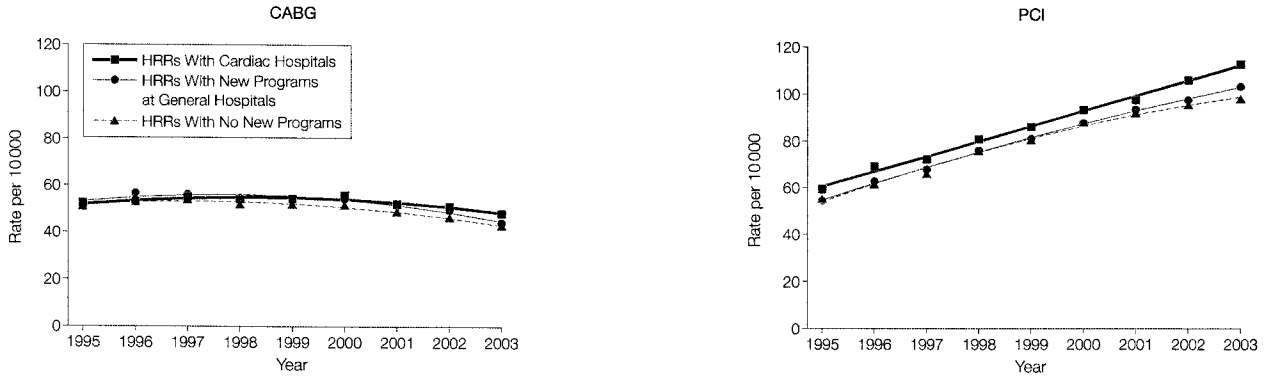
We also examined whether cardiac hospitals were selectively opening in already growing markets. Prior to their introduction, the rate of change for total revascularization was not significantly different in HRRs where cardiac hospitals opened than in HRRs where new cardiac programs opened at general hospitals (difference, +0.7/10 000 per year [95% CI, −0.8 to 2.2]; $P=.39$) or HRRs with no new programs (difference, +0.8/10 000 per year [95% CI, −0.5 to 2.0]; $P=.24$). Finally, we found that at the end of the study

Figure 1. Population-Based Rates of Total Revascularization by Year in Hospital Referral Regions (HRRs) With Cardiac Hospitals, HRRs With New Cardiac Programs at General Hospitals, and HRRs With No New Programs



Rates were adjusted for age, sex, and race using direct standardization. Trend lines were generated using fractional polynomial regression.

Figure 2. Population-Based Rates of Coronary Artery Bypass Graft (CABG) and Percutaneous Coronary Intervention (PCI) by Year in Hospital Referral Regions (HRRs) With Cardiac Hospitals, HRRs With New Cardiac Programs at General Hospitals, and HRRs With No New Programs



Rates were adjusted for age, sex, and race using direct standardization. Trend lines were generated using fractional polynomial regression.

period cardiac hospitals contributed substantially to the utilization of total revascularization within markets when compared with new cardiac programs at general hospitals. The mean procedural volume of cardiac hospitals in Medicare beneficiaries was 4-fold higher than that of new cardiac programs at general hospitals, while the percentage of coronary revascularizations within the HRRs that was performed at cardiac hospitals was approximately 2-fold higher (TABLE 3).

COMMENT

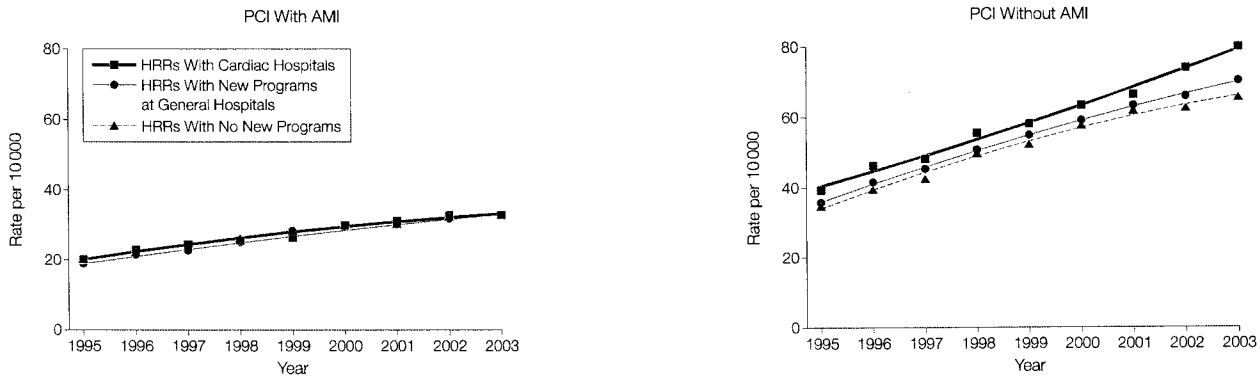
We found that rates of change for total revascularization, CABG, and PCI were higher for Medicare beneficiaries in HRRs after the opening of cardiac hospitals when compared with HRRs where new cardiac programs opened at general hospitals and HRRs with no new programs. The incremental number of coronary revascularizations in these 13 HRRs that was associated with the opening of cardiac hospitals was approximately 3032 between 1999 and 2003. Although we are unable to comment directly on the appropriateness of these procedures, these findings raise the concern that the opening of cardiac hospitals may lead to greater procedural utilization beyond the simple addi-

Table 2. Adjusted Rates of Coronary Revascularization per 10 000 After the Opening of New Programs*

Type of Procedure	Rates Per 10 000 (SE)			% Change (95% CI)
	Baseline Year†	Year 2	Year 4	
Coronary revascularization				
HRRs with cardiac hospital	134.4 (5.5)	151.2 (7.0)	160.2 (9.0)	+19.2 (+6.1 to +32.2)
HRRs with new cardiac program at a general hospital	136.1 (2.4)	144.5 (2.3)	145.0 (2.3)	+6.5 (+3.2 to +9.9)
HRRs with no new program	132.8 (2.5)	141.6 (2.6)	142.6 (2.8)	+7.4 (+3.2 to +11.5)
CABG				
HRRs with cardiac hospital	51.6 (2.7)	52.4 (2.9)	49.6 (3.6)	−3.9 (−17.6 to +9.9)
HRRs with new cardiac program at a general hospital	54.4 (1.0)	51.0 (0.9)	44.1 (0.8)	−18.9 (−21.7 to −16.0)
HRRs with no new program	52.4 (0.8)	49.3 (0.8)	42.8 (1.0)	−18.3 (−22.1 to −14.5)
PCI				
HRRs with cardiac hospital	82.4 (4.0)	98.8 (4.9)	110.9 (6.2)	+34.6 (+19.8 to +49.4)
HRRs with new cardiac program at a general hospital	81.9 (2.0)	93.6 (2.0)	100.9 (2.1)	+23.2 (+18.2 to +28.2)
HRRs with no new program	80.5 (2.0)	92.1 (2.1)	99.4 (2.4)	+23.5 (+17.5 to +29.4)
PCI with AMI				
HRRs with cardiac hospital	27.0 (1.1)	29.4 (1.1)	31.2 (1.2)	+15.6 (+6.7 to +24.8)
HRRs with new cardiac program at a general hospital	26.8 (0.6)	29.9 (0.5)	32.5 (0.6)	+21.3 (+17.2 to +25.7)
HRRs with no new program	27.8 (0.6)	30.7 (0.5)	33.2 (0.7)	+19.4 (+14.7 to +23.7)
PCI without AMI				
HRRs with cardiac hospital	55.6 (3.6)	69.4 (4.6)	79.0 (5.9)	+42.1 (+21.4 to +62.9)
HRRs with new cardiac program at a general hospital	55.4 (1.7)	63.8 (1.7)	68.1 (1.8)	+22.9 (+16.4 to +29.2)
HRRs with no new program	52.9 (1.7)	61.5 (1.8)	66.0 (2.0)	+24.8 (+17.4 to +32.3)

Abbreviations: AMI, acute myocardial infarction; CABG, coronary artery bypass grafting; CI, confidence interval; HRRs, hospital referral regions; PCI, percutaneous coronary intervention.
*Adjusted for age, sex, race, US region, baseline year of 1999, presence of multiple new programs within the HRR, and mean socioeconomic status of the HRR.
†The baseline year of 1999 was used to reflect the midpoint of the study period when calculating the adjusted rates.

Figure 3. Population-Based Rates of Percutaneous Coronary Intervention (PCI) With and Without Acute Myocardial Infarction (AMI) by Year in Hospital Referral Regions (HRRs) With Cardiac Hospitals, HRRs With New Cardiac Programs at General Hospitals, and HRRs With No New Programs



Rates were adjusted for age, sex, and race using direct standardization. Trend lines were generated using fractional polynomial regression.

Table 3. Coronary Revascularizations Performed in Medicare Beneficiaries by Cardiac Hospitals and New Cardiac Programs at General Hospitals at the End of the Study Period (2003)

	Cardiac Hospitals		New Cardiac Programs	
	Coronary Revascularizations per Hospital, Mean (SD), No.	Coronary Revascularizations in the HRR Performed at Cardiac Hospitals, Mean (SD), %	Coronary Revascularizations per Hospital, Mean (SD), No.	Coronary Revascularizations in HRR Performed at New Cardiac Programs, Mean (SD), %
HRRs with cardiac hospitals	808.6 (370.5)	35.2 (20.2)	152.5 (143.0)	14.3 (14.2)
HRRs with new cardiac programs at general hospitals	NA	NA	161.1 (175.1)	18.0 (19.2)

Abbreviations: HRRs, hospital referral regions; NA, not applicable.

tion of capacity to a market. This is particularly worrisome since cardiac hospitals may not substantially improve clinical outcomes when compared with general hospitals with similar procedural volumes.[10]

An additional finding was that among patients with acute myocardial infarction, the subset of patients who are likely to gain the most clinically from PCI,[20,21] there was no association between the opening of cardiac hospitals and the rate of change for PCI. The rate of change for PCI in patients without acute myocardial infarction, in contrast, was significantly higher in HRRs where cardiac hospitals opened. Although we could not assess appropriateness, the benefits of PCI are frequently less clear in this group of patients,[22] suggesting that our findings may be partly driven by more discretionary cases. Finally, we found that cardiac hospitals had significantly higher procedural volumes than new cardiac programs at general hospitals and were responsible for more than twice the share of revascularizations within an HRR performed by the end of the study period.

Our findings differ somewhat from a recent study performed by the Medicare Payment Advisory Commission (MedPAC).[23,24] In that study, HRRs where cardiac hospitals opened had a mixed association with utilization of CABG and PCI between 1996 and 2002. The likely explanation for the discrepancy between reports is that the MedPAC study did not account for the specific years that a specialty hospital was open. As a result, HRRs where cardiac hospitals opened in 2002 were considered the same as those that opened in 1997, although the former would be expected to only briefly affect utilization. A shorter study period also may have restricted the ability to detect potential associations. Another key difference between the 2 reports is that ours also examined rates of change in HRRs after the development of new cardiac programs at general hospitals. Distinguishing between the particular effect of cardiac hospitals and the mere addition of new cardiac programs at general hospitals is critical given recent growth in hospital-based services for coronary revascularization over the last decade.

Among potential mechanisms underlying our findings, the most concerning is the influence of physician ownership on decisions regarding the use of coronary revascularization. Self-referral of patients by physician owners to facilities where they have significant financial interest is generally prohibited by federal antikickback laws with the exception of "whole" hospitals.[25] Hospitals—including specialty hospitals—are exempted because they typically provide a diverse enough array of services so that physician owners are thought to gain little from self-referral. However, specialty hospitals are smaller and provide fewer services than general hospitals making them more analogous to departments within general hospitals, which are regulated by federal antikickback laws.[25]

Our findings could also be explained by issues unrelated to physician ownership. Specialty hospitals may lead to higher utilization of these procedures through improved efficiencies in patient care that do not directly reflect financial incentives. Cardiac hospitals might have opened in markets already predisposed to higher rates of coronary revascularization due to patient factors or local market conditions, although we found no direct evidence that this was occurring. Finally, anecdotal reports suggest that higher utilization of these procedures within a market may be due to general hospitals positioning themselves more aggressively after the opening of a specialty hospital.[9,26] However, a national survey of 603 US hospitals by the General Accounting Office found little evidence this was occurring.[27]

Our study should be interpreted with the following limitations in mind. First, this analysis cannot comment on the "correct" population-based rate for coronary revascularization. In fact, it may be that the opening of cardiac hospitals leads to more appropriate use of these procedures. Future studies will need to focus on this issue at both cardiac and general hospitals.

Second, in this type of analysis we are unable to fully attribute higher rates of coronary revascularization in HRRs where cardiac hospitals opened to these specific facilities. Instead, changes in the use of coronary revascularization after the opening of cardiac hospitals reflect the environment in which they and other competing hospitals exist. Our findings of higher procedural volumes at cardiac hospitals and their greater market share at the end of the study period are only suggestive of their role in higher rates of coronary revascularization.

Third, we were unable to evaluate the extent to which physician ownership at cardiac hospitals—which report-

edly ranges from 21% to 49%—influences utilization given a lack of publicly available information.[23] Fourth, data in this analysis were limited to Medicare beneficiaries (although this group does represent a majority of the patients undergoing coronary revascularization in the United States). Finally, we identified only 14 cardiac hospitals that opened during the study period. Although specialty hospitals have generated great controversy among policy makers, they are a relatively new phenomenon and important differences may exist across individual facilities. Expiration of the moratorium on new specialty hospital construction is expected to increase their numbers in the coming years.

Despite these limitations, our findings may have important policy implications. The CMS recently issued their final report to Congress implementing a strategic plan for specialty hospitals.[13] Their plan primarily involves revisions to the inpatient prospective payment systems to "level the playing field" between specialty and general hospitals and limit financial incentives for investing in certain services simply due to profitability. It also proposes new "gainsharing" and value-based payment approaches to better align physician and hospital incentives toward improving care at general hospitals. Reforms directly related to physician ownership include enhanced transparency of financial relationships. More stringent measures, such as limiting investments by physician owners, were not included. The extent to which additional measures are needed will require further data on appropriateness of care at specialty hospitals as well as the impact of greater utilization of these procedures on patient outcomes.

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Study concept and design: Nallamothu, Rogers, Chernew, Eagle, Birkmeyer.
Acquisition of data: Nallamothu, Birkmeyer.
Analysis and interpretation of data: Nallamothu, Rogers, Krumholz, Eagle, Birkmeyer.
Drafting of the manuscript: Nallamothu, Rogers.
Critical revision of the manuscript for important intellectual content: Nallamothu, Rogers, Chernew, Krumholz, Eagle, Birkmeyer.
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